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USSR
ELECTRONIC AND PRECISION
EQUIPMENT

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USSR ELECTRONIC AND PRECISION EQUIPMENT

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I. ITEMS OF SPECIAL INTEREST

A. Observatory Builds Large Radiotelescope

The tall steel antennas (1) of the large radiotelescope of the Byurakan Astrophysical Observatory were recently erected in the settlement of Saravand, near the Village of Byurakan. This radiotelescope is designed for studying weak sources of cosmic radiation.

On completion of assembly, the area of this "mirror-antenna" will be 5,000 sq m, making it the largest of its kind in the USSR. It was developed by the Design Bureau of the Instrument Making Laboratory under the Byurakan Astrophysical Observatory, and all machining operations in its manufacture were performed in the workshops of this laboratory. Workers of the Radioastronomical Laboratory also participated in this work.

This new radiotelescope will also be used to study the upper layers of the earth's atmosphere.

A special building has already been built in Saravand and equipped with the receiving apparatus for the radiotelescope. Alongside this is a new building which is being equipped for the radioastronomical laboratory and which will be used for developing new radiotelescope designs and new methods of study.

The whole complex of equipment in Saravand will soon constitute a radioastronomical station of the Byurakan Astrophysical Observatory. (Yerevan, Kommunist, 28 Jun 58)

(1) Photo available in source, p 3, top

B. Unusual Administration

Under the Udmurtskiy Sovnarkhoz, there is an Administration of Special Machine Building (Upravleniye spetsial'nogo mashinostroyeniya) operating parallel to the Administration of Metallurgical and Machine Building Industry (Upravleniye metallurgicheskoy i mashinostroyitel'noy promyshlennosti). Both these administrations have their own separate planning groups. In addition, the Economic Planning Division of the sovnarkhoz does planning for the Administration of Special Machine Building. (Moscow, Promyshlennno-Ekonomicheskaya Gazeta, 21 Nov 58)

[Comment: It is probable that the Administration of Special Machine Building is in charge of a few plants about which scant information has been given in the press; namely, the Izhevsk Firearms Plant, the Izhevsk Motorcycle Plant, the Izhevsk Machine Tool Plant, and the same or other plants referred to only as "The Izhevsk-Plant."]

C. Thermoelectric Batteries

Certain semiconductive materials can convert heat directly into electric energy and are used for producing thermoelectric batteries. Industry has already begun the mass production of certain types of batteries for regions that have no electricity.

Boiler thermal batteries are about the size of the palm of one's hand and the flat rods are made from an alloy of lead, antimony, and certain other elements. They are heated on one side by gases to a temperature of about 700 degrees and the other side is cooled by boiling water, the temperature of which is slightly more than 100 degrees. Current develops as a result of the difference of temperature in the semiconductive battery.

The All-Union Institute for the Electrification of Agriculture and the Institute of Semiconductors have designed such a boiler. (Moscow, Moskovskaya Pravda, 11 Jul 58)

D. New Industrial Jewel Plant

The Tbilisi Agat Plant is being founded on the site of the Tbilisi Gruzsamotsvety Plant located on ulitsa Khetagurova. The Agat plant will produce industrial jewels from agate. Such jewels are used extensively in the electrical engineering and instrument making industries. Raw material for this plant will be the local Akhaltsikhe agate.

Specialists from the Yaroslavl' economic region will help to set up production at the Tbilisi Agat Plant. -- Sh. Gigilashvili, Director, Tbilisi Agat Plant (Tbilisi, Zarya Vostoka, 9 Jul 58)

E. Planned Shortage of Printing and Publishing Machinery

The 250-percent increase in the production of machinery for the printing and publishing industry, which will occur by the end of 1965, will satisfy only 61 percent of the needs of the industry for such machinery at that time.

According to A. D. Molchanov, chief of the production and technical division of the Ministry of Culture, USSR, the present production capacity of printers and publishers is insufficient for publishing on time the necessary number of high-quality publications. Because of the lack of high-speed machinery for illustrated printing, most serial publications are published without pictures; in addition, many schoolbooks lack colored illustrations.

In most cases, USSR machines are of poor quality. Some sovnarkhozes have printing and publishing machine plants under their jurisdiction divert the production of these plants into other fields. Examples of this are the elimination of the production of heavy brochure binding equipment at the Leningrad Printing and Publishing Machine Plant and the overloading of the Khar'kov and Kiev printing and publishing machine plants with other types of machines.

According to P. S. Prokof'yev, chief engineer of the Special Design Bureau for Printing and Publishing Machine Building, there are no special funds for mastering the production of new machinery. Consequently, printing and publishing machine plants do not want to bother with new machinery, and customers for such machines do not want to pay the higher price asked for them. (Moscow, Poligraficheskoye Proizvodstvo, Oct 58, p 3)

II. LOCAL PRODUCTION AND ORGANIZATION

A. Armenian SSR

Since the establishment of a branch of the Scientific Research Institute of the Electrical Engineering Industry at the Yerevan Armelektro Plant 2 years ago, this branch has helped the plant to master the production of a single all-union series of synchronous generators up to 100 kw in power, and four types of new 30- and 50-kw, 1,000- and 1,500-rpm generators. This branch has also developed a single series of sizes 1 and 2 power transformers with powers up to 560 kva and voltages of 6 and 10 kv.

The branch receives all-around aid from its parent organization in Moscow. Since the establishment of the Armenian economic administrative region, the scope of the branch's activity has been broadened. By recommendation of the sovnarkhoz, new divisions and sectors concerned with instrument making and industrial electronics, cable and insulation technology, and illumination engineering apparatus and small electric motors have been formed. They are working on problems of interest to local cable, instrument, electrical, and vacuum-tube plants. (Moscow, Promyshlennno-Ekonomicheskaya Gazeta, 27 Jun 58)

B. Georgian SSR

The Georgian Sovnarkhoz has started organizing new electrical engineering enterprises, which will be put into operation during 1958-1960.

Plants are being organized in Tbilisi for the production of electric motors for cranes, micropower electric motors, and electric welding equipment. It is planned to build new enterprises in Batumi for the manufacture of electric carts and equipment for them, and for the production of

electrical consumer appliances. New plants in Sukhumi, Staliniri, Gori, Poti, and Kaspi will produce electrical vibrating machines and electric planning machines, instruments and automation equipment for the light and food industries, cable products, and fluorescent lamps.

It is planned to open a scientific research institute of the electrical engineering industry with a planning and design bureau in Tbilisi.

According to B. Akimenko, deputy chairman of the Georgian Sovnarkhoz, these new plants of the electrical engineering industry will facilitate more extensive automation of industrial processes.

The new enterprises are being developed primarily on the basis of existing production space and capacity. (Yerevan, Kommunist, 1 Jul 58)

C. Lithuanian SSR

It will be possible to take pictures in cosmic space with the aid of electrography, and to rapidly manifold complex sketches. Electrography may also be used for the printing of books. Ferromagnetic and semiconductor tape will replace huge printing machines. This will eliminate the need for type.

Engr I. Zhilevichyus (Vil'nyus) has worked for several years on the problem of using electrographic methods of manifolding images. He developed a process of recording them magnetically and designed an apparatus for multiplying images by means of electrography.

The experimental shops of an institute have built a machine for the industrial production of semiconductor photographic paper (fotopoluprovodnikovaya brumaga).

The laboratories of an institute have developed a special X-ray film which does not require prolonged processing. It is covered with a sensitive semiconductor layer, and the X rays serve as a light source. A doctor equipped with a portable X-ray machine can make a picture without leaving the patient's bedside.

This "express-Roentgenograph" can also be used extensively in metallurgy and machine building. (Kishinev, Sovetskaya Moldaviya, 23 Jul 58)

III. ELECTRONIC EQUIPMENT

A. Bulbs, Tubes, and Transistors

At present, only one type of xenon lamp, the GSVD-120 high-pressure 120-watt lamp, is being series-produced in the USSR [at the Moscow Electric Bulb Plant]. (Moscow, Poligraficheskoye Proizvodstvo, Oct 58, p 18)

Recently, successful work on the utilization of mechanically controlled vacuum tubes in control and measuring equipment has been done. The laboratory of the Moscow Electric Bulb Plant developed a model of an electronic micrometer for checking linear measurements of products with a precision up to a fraction of a micron.

High-sensitivity transmitters have been developed in the joint laboratory for electronic-mechanical instruments of the All-Union Correspondence Institute of Railroad Transport Engineers and the Moscow Institute of Railroad Transport Engineers.

However, many valuable discoveries by USSR researchers in the field of mechanically controlled vacuum tubes are not being put to use in technology. As yet, the USSR has no vacuum tube plant which could undertake even experimental and small-series production of mechanically controlled tubes. This is why many scientific research organizations and plants in the main contract for the development of mechanically controlled tubes with laboratories and educational institutions which do not have sufficient experience in producing such elements. On the other hand, in foreign countries where such tubes appeared much later than in the USSR, mechanically controlled tubes are being produced in large series.

The scientific and technical societies of instrument making and railroad transport have often resolved to have a production base for mechanically controlled tubes set up, but such resolutions have not been kept.

The Bureau of Scientific and Technical Information of the State Committee for Radioelectronics and other publishing organizations fail to issue literature on mechanically controlled tubes. For this reason, many workers, specialists, and production workers know practically nothing about these instruments.

The USSR vacuum tube industry and scientific research organizations have the capacity to begin the development and production of mechanically controlled tubes, since their production process is not very different from that employed for ordinary receiver-amplifier tubes.

Sovnarkhozes, particularly those of Moscow and Leningrad, should organize the mass production of electron and ion mechanically controlled tubes at their vacuum tube enterprises. (Moscow, Promyshlennno-Ekonomicheskaya Gazeta, 27 Jun 58)

The [Leningrad] Svetlana Plant plans to produce 250,000 above-plan vacuum tubes and semiconductors in 1958.

The semiconductor shop (2) of the plant has begun the production of four new types of semiconductors. The shop will have produced 100,000 above-plan semiconductors by the opening of the 21st Congress of the CPSU [27 January 1958]. (Leningradskaya Pravda, 23 Oct 58)

(2) Photos of the shop's assembly section and assembly methods available in source, p 2, lower left

B. Radio

A radio receiver powered directly by the sun's rays has been developed in the Leningrad Institute of Radiobroadcasting Reception and Acoustics by engineers S. Kalikham and A. Ososkov. This radio is powered by so-called solar battery consisting of several series-connected silicon semiconductor wafers. Acting as a photocell, each of a total of 14 of these batteries converts sunlight into electrical energy to power the receiver. This energy is sufficient not only to power the radio, but also to charge a miniature storage battery for use in the absence of sun's rays.

The application of semiconductor elements made it possible to design a long-lasting and economical portable apparatus. This radio receives broadcasts on the long- or medium-wave bands. (Moscow, Komsomol'skaya Pravda, 3 Jul 58)

The Syurpriz pocket radio is a superhetrodyne set with printed circuits and seven transistors. It will receive broadcasts in the long- and medium-wave bands. It has an internal magnetic antenna as well as an external antenna. The speaker is 57 mm in diameter and has an average sound pressure of one bar. Current is supplied from four type KNP-0.42 batteries, which can be recharged from ordinary house current with the aid of a special device. The batteries are good for 12-14 hours of operation before recharging is necessary.

On off switching and volume control are effected with a single knob, and stations are turned by means of a dial with ten subdivisions. The internal magnetic antenna is directional, which reduces interference to a minimum.

The plastic cabinet of the Syurpriz measures 155 x 80 x 38 mm, and the set weighs 520 grams.

It is planned to produce 500 of these sets in 1958 and 20,000 in 1959. The price is 450 rubles. (Moscow, Novyye Tovary, No 11, 1958, p 3)

C. Television

Scientific research institutes in Moscow and Leningrad have developed a compatible color-television system, several variants of which have been developed under the direction of S. V. Novakovskiy, Candidate of Technical Sciences, at the State Scientific Research Institute of the Ministry of Communications USSR. All these variants are based on M. V. Lomonosov's three-component color theory.

A camera has been installed in the experimental studio of the institute and is currently being used for experimental color-television transmissions.

The heart of any television set, the picture tube, is especially complex in a color-television receiver. There are three electron guns in this tube, and each of them receives a radio signal, transmitted at a certain frequency, which corresponds to one of the primary colors; red, blue, or green.

The screen inside the picture tube is covered with a "mosaic" of three-dot groups of phosphor, an inorganic crystalline substance. Each dot of each group represents one of the primary colors. A screen 53 cm in diameter contains about 1.5 million of these dots of colored phosphor. The electron beam falls on certain groups of these dots, causing them to glow and thus to create a color image.

Three times per week, the television studio of the institute transmits experimental color broadcasts on channel 5 over a radius of 6-8 km. The Moscow Television Center will begin regular test transmissions of color images early in 1959. (Moscow, Leninskoye Znamya, 29 Jun 58)

The Leningrad All-Union Scientific Research Institute of Television has completed work which has been carried on for several years in the development of the first complete apparatus in the USSR for color television. The industrial model of the receiver has already undergone successful testing. The diameter of its [picture] tube is 53 cm, and it will receive black-and-white as well as color images. It has 12 channels, and there have been only insignificant changes in tuning. Only two knobs have been added for controlling the color image.

Blueprints and industrial models of the new television set are being submitted to enterprises of the radio engineering industry for series production.

The institute has started manufacturing an experimental model of a television center. This equipment will be installed in Moscow toward the end of 1958, and color-television broadcasts will be seen in Moscow early in 1959. (Moscow, Izvestiya, 2 Jul 58)

Equipment for a new television center planned for Petropavlovsk in the Kazakh SSR is being produced in Leningrad, in accordance with a plan drawn up by the All-Union Institute of Television. The equipment will include instruments which convert and form television signals, sound equipment, video control screens, and transmission control panels. The four-channel Petropavlovsk television center will have the latest movie projectors and optical systems for the continuous transmission of large-format film, along with high-quality sound apparatus. A synchrogenerator will synchronize the operation of the television center with all the receivers and transmitters.

The equipment for the Petropavlovsk Television Center will be tested and adjusted at the All-Union Institute of Television.

Leningrad workers are also assembling a new mobile television station for Karaganda. This station will be similar to the model exhibited at the Brussels Fair. It can transmit to its parent television center from up to 25 km away.

At present, new television equipment for controlling the operations of coal mines, railroad yards, and metallurgical enterprises is being put into production. (Alma-Ata, Kazakhstanskaya Pravda, 24 Jul 58)

The radio industry has produced an improved Rekord television set, which receives 12 television channels and ultrashort-wave broadcasts. This set has 15 tubes; its sensitivity is at least 200 microvolts; its screen size is 210 x 280 mm and its input power is 140 watts. (Moscow, Vestnik Svyazi, Dec 58, inside front cover)

D. Prices

The following prices have been quoted in an official prize list for the second 1958 state lottery of the Latvian SSR:

| <u>Prize</u> | <u>Price (rubles)</u> |
|--------------------------|-----------------------|
| Rubin television set | 2,600 |
| Rekord television set | 1,750 |
| KVN-49 television set | 850 |
| Iyuks radio-phonograph | 2,300 |
| Daugava radio-phonograph | 1,100 |
| Daugava radio receiver | 765 |

(Riga, Sovetskaya Latvija, 20 Sep 58)

E. Telegraphic Apparatus

During 1957, a group of engineers at the Riga VEF Plant developed and put into production an automatic device for sending and receiving telegrams. The introduction of this apparatus will permit a saving of 2.5 million rubles in 1958 alone. (Riga, Sovetskaya Latvija, 20 Jul 58)

The L'vovskiy Sovnarkhoz, which has accepted the order for the production of the FTAP telephotographic apparatus, has set a wholesale price on it that is 20 times as high as that of the ST-35 telegraphic apparatus. Without a doubt this unjustified price policy will make it impossible to use the new apparatus on a wide scale. (Moscow, Vestnik Svyazi, No 58, p 2)

IV. COMPUTERS

Huge electronic computers are used for solving complex mathematical problems, but the need has also arisen for smaller mechanisms for solving less complex problems.

Such a small electronic computer has been designed by engineers of the State All-Union Design and Technological Bureau for Planning Computers, in cooperation with scholars of the chairs of automatics and telemechanics of the Polytechnic Institute imeni M. I. Kalinin. A working model of this small machine consists of special electronic logical devices, storage systems, and other devices. A reduction in size was accomplished through extensive use of semiconductors, ferrite-core matrices, and other new devices. These new computers will be simpler and less expensive to manufacture.

Scholars and engineers are currently developing the first small computers for use by bookkeepers and tellers. These machines relay the data to central reception points at great distances. (Leningradskaya Pravda, 9 Jul 58)

A new BESM-2 high-speed electronic computer is being installed in one of the spacious halls of the Institute of Precision Mechanics and Computer Technology of the Academy of Sciences USSR. This computer is a modernized version of the BESM-1 and is designed for series production. Its operational storage capacity is 2,046 numbers, or double that of the BESM-1. It records and selects a number in ten-millionths of a second.

The external storage of the BESM-2 consists of two magnetic drums and eight tape recorders with tapes. The drums have a capacity of 10,240 numbers and up to 800 numbers per second can be recorded on each. About 120,000 numbers can be stored on tape.

Ferrite cores are utilized in the machine's storage unit. The installation of the BESM-2 will be finished in 1958. (Moscow, Nauka i Zhizn', Nov 58, p 6)

Gipromorneft' [Scientific Research Institute for Planning in the Off-shore Oil Industry] has developed a special electrical computing table (3) for making calculations on the electrical anticorrosion protection of pipelines, metal scaffolds, and other oil industry installations. (Moscow, Neftyanik, Oct 58, facing p 18)

(3) Photo available in source, facing p 18, bottom

Complex calculations are performed by machine in the huge enterprises of Leningrad, but until recently, capital repair of these machines had always been done in Moscow.

The Leningrad Machine Computing Factoring recently organized a special shop for repairing computers. This shop is equipped with the latest machine tools and checking instruments for regulating complex computers.

The publishing house of the factory where special perforated cards for electrical and electronic computers are made, has also received new equipment. (Leningradskaya Pravda, 24 Jul 58)

V. PRECISION EQUIPMENT

A. Instruments

1. Calibration

About 30 prototype units and instruments developed in institutes of the Committee for Standards, Measures, and Measuring Instruments have been submitted for production to the instrument making and electrical engineering industries.

The following were developed by VNIMM (All-Union Scientific Research Institute of Metrology imeni D. I. Mendeleyev):

- a. A calibration unit for reproducing ohm on direct current.
- b. A new comparator for collating calibration and prototype standard design elements.
- c. A calibration unit which reproduces the value of gamma radiation (in roentgens/sec) with quantum energy from 250-1,500 kiloelectron volts.
- d. An apparatus for reproducing the triple point temperature of benzoic acid to a mean square error of plus or minus .002 degree centigrade.
- e. An apparatus for reproducing the solidification point of zinc of high purity to a mean square error of plus or minus .001 degree centigrade.

The following calibration instruments and units were introduced in other institutes and laboratories of the committee:

a. Stainless steel operating calibration instruments, which weigh one kg, have been introduced in all the committee's institutes and in the Latvian State Checking Laboratory for measurements.

b. A calibrating unit for checking the attenuators of standard signal generators for output and for checking attenuators up to 100 decibels in a wave length range of 1.8-30 cm has been introduced in VNIIFTRI (All-Union Scientific Research Institute of Physicotechnical and Radio Engineering Measurements).

c. An astronomical pendulum clock with isochronal suspension has been introduced in the State Time Service of the USSR.

d. A lense-type spectropyrrometric unit for calibrating thermal tubes to 3,000 degrees centigrade has been developed by KhGIMIP (Khar'kov State Institute for Measures and Measuring Instruments) and introduced in VNIIM and in KhGIMIP.

The following measuring units, which have been developed by metrological institutes, should be noted:

a. A portable instrument for checking flow gauges has been designed by Petrov and developed by VNIIK (All-Union Scientific Research Institute of the committee). The experimental shops of VNIIK and the Riga Etalon Plant produced 212 instruments in 1955-1956. The [Riga] Plant plans to produce 80 instruments in 1957.

b. A prototype vacuum gauge with a balance piston has been developed by VNIIK. Ten of these instruments were produced by the Riga Etalon Plant prior to 1957 and 58 are planned for production in 1957.

c. An automatic water thermostat for checking technical thermometers has been developed by and introduced in KhGIMIP. The Riga Etalon Plant plans to produce 15 thermostats in 1957.

d. A contact instrument for checking angular measures has been developed by KhGIMIP. The Gor'kiy Experimental Design Bureau of the committee plans to produce 50 such instruments in 1957.

e. Assemblies of prototype densitometers in sets of 19 units and alcoholometers in sets of 11 units have been developed by VNIIM. The Klin Plant will produce 70 sets in 1957.

f. Model copies of finished surfaces have been developed by VNIIM. The [Riga] Etalon Plant will produce 50 sets in 1957.

g. Resistor boxes up to 10^{10} ohms for checking megohmmeters have been developed by VNIIM. The [Riga] Etalon Plant will produce five boxes in 1957.

h. A prototype unit for measuring pressures up to 10,000 kg/sq cm has been developed by and introduced in VNIIFTRI. The experimental shops of the All-Union Scientific Research Institute of the committee will produce four units in 1957.

i. Platinum resistance thermometers for measuring low temperatures have been developed by VNIIFTRI. The experimental shops of the institute will produce 60 thermometers in 1957.

j. Inspection balances for measuring 2 kg have been developed by NGIMIP (Novosibirsk State Institute for Measures and Measuring Instruments). The Riga Etalon Plant will produce an experimental consignment in 1957 and will begin series production in 1958.

k. Prototype capacitors with a range of .0001-1 micromicrofarads have been developed by NGIMIP. Experimental shops of the institute have produced five sets and will produce 15 more sets in 1957-1958.

l. A prototype short interval timer for checking time meters has been developed by VNIIM. It is planned to produce seven units in 1957.

In 1957 and the beginning of 1958, state checking laboratories for measurements will receive the following prototype instruments which have been developed by institutes of the Committee for Standards, Measures, and Measuring Instruments: 16 salt thermostats for checking thermometers up to 500 degrees centigrade, 300 band meter-comparators, 25 automatic collimating instruments, 31 units for checking prototype dosimeters by the use of a hydraulic weighing instrument, 100 class No 2 prototype piston-gauges with a range of .4-6 kg/sq cm, 100 attachments for checking lever indicators, 10 power supply sources with undistorted [power] curve shapes, and 10 hexahedrons for checking current optical dividing heads.

The following prototype radio measuring units and instruments have been developed by institutes of the Committee for Standards, Measures, and Measuring Instruments:

a. A unit for checking pulse generators has been developed by VNIIFTRI. Eight units were produced in 1956 and two in 1957.

b. Type OKV-2 prototype compensating voltmeter for measuring very-high-frequency voltage has been developed by VNIIM. Five voltmeters are to be produced in 1957.

c. The UGSS-2 unit for checking standard signal generators has been developed by VNIIM. The [Riga] Etalon Plant produced nine units in 1956 and is slated to produce five more in 1957.

d. Type IG pulse generator, which is installed in a unit for checking disturbance meters up to 25 megacycles, has been developed by VNIIFTRI. The [Riga] Etalon Plant produced three IG generators in 1956.

e. Sets of prototype gauges for checking quality meters (Q meters) have been developed by NGIMIP. Three sets were produced in 1956. The experimental shops of the institute plan to produce 35 sets in 1957.

f. Types UIMZ-3 and UIMZ-10 units for checking attenuators in the 3-10-cm wave band have been developed by VNIIFTRI. The Leningrad Etalon Plant plans to produce six units of each type in 1957.

g. A prototype broad band attenuator in the 3-cm wave band has been developed by VNIIFTRI. The Leningrad Etalon Plant plans to produce six units in 1957.

h. Prototypes of dielectrics for checking dielectric meters has been developed by VNIIFTRI. In 1956, six sets were produced and certified for institutes and laboratories of the Committee for Standards, Measures, and Measuring Instruments.

i. The type UMS-1 measuring-type amplifier has been developed by VNIIFTRI. The Leningrad Etalon Plant produced eight units in 1956.

j. The type UVGS unit for checking vacuum tube voltmeters and standard signal generators has been developed by VNIIM. The [Leningrad] Etalon Plant plans to produce three UVGS units in 1957.

k. A set of prototype ammeters for measuring from one measuring from one milliamper to 100 amper in a frequency range of up to 100 mc with supply generators attached has been developed and introduced in VNIIFTRI. Experimental shops of the institute will produce two units in 1957.

l. An IS-4 total resistance meter has been developed by NGIMIP. Experimental shops of the institute produced two units in 1956 and plan to produce three units in 1957.

m. Type MKh-3 prototype modulemeter has been developed by KhGIMIP. The Leningrad Etalon Plant plans to produce five prototype modulemeters in 1957.

Institutes of the Committee for Standards, Measures, and Measuring Instruments have developed the following new methods of measuring which have been introduced in other institutes and in industry:

a. A method of measuring magnetic field intensity has been introduced in VNIIM, KhGIMIP, and the Sverdlovsk Branch of VNIIM.

b. A method of checking thermocouples made from alloy (platinum and rhodium), in temperatures up to 1,800 degrees centigrade, has been introduced in VNIIM, the Sverdlovsk Branch of VNIIM, the NGIMIP, the OKB [Special Design Bureau] of the Instrument Making Industry, and the Institute of Metallurgy of the Academy of Sciences USSR.

c. A method of measuring the temperature of molten metals was introduced in the instrument making industry in 1957.

V. V. Kandyba, leader of the Section of Thermal Measurement of the Khar'kov State Institute of Measures and Measuring Instruments, has developed and introduced prototype optical pyrometers, a unit for checking radiation pyrometers in temperatures up to 1,800 degrees centigrade, and automatic temperature regulators.

In accordance with a government decree, special bonus funds have been established to encourage workers to complete scientific research projects on schedule and to have them put into practical use. (Moscow, Izmeritel'naya Tekhnika, No 5, Sep-Oct 57, pp 3-6)

The Klin Thermometer Plant has produced a set of class 2 prototype mercury thermometers with a range of from minus 30 to plus 300 degrees centigrade; set of class 2 prototype mercury thermometers with a range of from zero to plus 500 degrees centigrade; and a class 2 prototype mercury thermometer with a range of from plus 50 to 100 degrees centigrade. The Klin Thermometer Plant has also produced a set of class 2 prototype liquid thermometers with a range of from minus 90 to plus 20 degrees centigrade (scale divisions of .1 and .2 degree centigrade).

The L'vov Teplokontrol' Plant has produced type KSI-55 measuring-type resistance coils of precision class No .01 with rated resistance of one, 10, and 100 ohms; the type MKMV DC bridge with a range of readings from one to 100,000 ohms (not more than .2 percent error); the type IRN-53 variable voltage generator with voltage feed of 1.2-1.5 v and a range of voltage input from minus 5 to plus 100 millivolts; the type PP portable potentiometer; and various resistor boxes.

The Moscow Platinopribor Plant has produced the type TS-24 thermostat with a power of 2 kw for checking manometric thermometers and other thermometers with large receptacles; the type T-40/600 tubular electric oven with an operating temperature of 1,000 degrees centigrade, a power of 25 kw, and a working area 40 mm in diameter and 600 mm in length; and a tubular electric oven with an operating temperature of 1,300 degrees centigrade, a power of 2.5 kw, and a working area of 40 mm in diameter and 600 mm in length.

The [Moscow] Fizpribor Plant has produced type LATR adjustable auto transformers.

The Ministry of Radio Engineering Industry has produced type GSS-6 standard signal generators with a frequency range of from 100 to 2,500 kc. (Moscow, Izmeritel'naya Tekhnika, No 5, Sep-Oct 57, p 40)

2. Industrial

The experimental model of a miniature neutron generator has been developed at the Institute of Automatics of Gosplan USSR by Yu. Alpat'yev, Yu. Miroshnichenko, A. Kolomiyets, G. Sokolovskiy, and other engineers, under the leadership of F. Krishtab, Candidate of Technical Sciences.

This instrument is used for checking the chemical composition of simple substances under production conditions. It develops a sufficiently powerful and uniform flow of radiation and is used for irradiating semiconductors and other materials to make their nuclei radioactive. The radioactivity is then measured by special electronic apparatus.

The new generator is controlled from a special panel. It is now being adjusted at the institute. In 1959, it is planned to put an experimental consignment of neutron generators into production. (Moscow, Promyshlennno-Ekonomicheskaya Gazeta, 27 Jun 58)

In 1957, the Khar'kov Teploavtomat Plant produced an experimental consignment of types EADS-VK and EADS-K-VK electronically controlled electromagnetic dosimetric stations. These stations are used for measuring out doses of up to ten or more components according to an industrial schedule in portions weighing 5-100 kg. The number of operational cycles is up to 500 per hour, with an hourly productivity of up to 30 tons. The station itself weighs 360-400 kg.

However, the Teploavtomat plant is unable to begin the series production of the new dosimetric stations, which will be highly useful at chemical, refractory materials, glass, chemicommetallurgical, and other enterprises, because it does not have adequate production capacity to do so. Gosplan USSR in the near future should solve the problem of their series production. -- D. Nevecherya, Chief Engineer, Teploavtomat Plant; A. Volik, Engineer (Moscow, Promyshlennno-Ekonomicheskaya Gazeta, 22 Jun 58)

The Frunze Physical Instrument Plant has produced the first models of electronic signal indicators. These new instruments will find extensive application at flour mills, sugar plants, cement plants, petroleum refineries, and other enterprises. With the aid of photocells, it is possible to determine the level of fluids or granulated and friable materials in closed containers where other methods of measuring would be ineffective. One thousand of these instruments will be produced during 1958.

The Division of the Chief Designer, headed by N. V. Yaloveg, has developed a more modern centrifuge, the TsLN-2. The number of revolutions has been increased from 5,000 to 7,000 in this new machine, and centrifugal force has been increased 12 percent. The TsLN-2 weighs 25 percent less, costs only half as much, and lasts twice as long as previous models.

The first experimental models have already been made and approved by the Ministry of Health USSR. This instrument will soon go into series production. (Frunze, Sovetskaya Kirgiziya, 6 Jul 58)

The design bureau of the Kiev Checking and Measuring Instruments Plant, by applying a principle advanced by Engr V. I. Kudryavtsevy, has developed a lense-type photovoltaic polarimeter with automatic adjustment for the sugar industry. The first model of this instrument, which is called a type SA automatic saccharimeter, was produced by the plant and displayed at the All-Union Industrial Exhibition in 1956. A second, improved model has now been produced by the plant. (Moscow, Izmeritel'naya Tekhnika, No 5, 1957, p 69)

In 1958, the Kazan' Teplokontrol' Plant began the production of the new TPG-1, TPR-1, TPZh-1 indicator-type manometric thermometers, which are designed for measuring temperatures of liquids, gases, or vapors in industrial installations. Specifications are as follows:

| | <u>TPG-1</u> | <u>TPR-1</u> | <u>TPZh-1</u> |
|-------------------------|----------------|----------------|----------------|
| Precision class | 1.0-1.5 | 1.0-1.5 | 1.0-1.5 |
| Thermometric agent | Nitrogen | Mercury | Xylol |
| Temperature range (deg) | -40 to +500 | -30 to +600 | -40 to +200 |
| Weight (kg) | 2.8-4 | 2.8-3 | 2.2 |

This is the first time in the history of USSR instrument making that mercury and liquid manometric thermometers have been developed and put into production.

Standard parts and subassemblies of series-produced indicator manometers are used in the design of these thermometers. If necessary, they can be used to cover a wider range of temperatures.

(Source gives additional information plus sketches of the new thermometers.) (Moscow, Byulleten' Tekhniko-Ekonomicheskoy Informatsii, No 7, 1958, pp 33-36)

The L'vov Termopribor [Thermal Instrument] Design Bureau has developed the DTV-018 low-inertia temperature transmitter. The sensitive element of this is a plate of thermoconductive resilient wear-resistant material bent in the shape of an arc to which the hot junction of a chromel-cupronickel thermocouple with thin band-shaped electrodes has been welded.

This transmitter, which is designed for the continuous accurate measurement of the temperature of cylindrical rolls used for processing rubber, tire cord, organic plastics, thin rolled sheet metal, paper, and other products, has been tested at the Moscow Tire Plant and has been submitted for series production. (Moscow, Promyshlennno-Ekonomicheskaya Gazeta, 25 Jun 58)

The Scientific Research Institute of Local and Fuel Industry of Gosplan Ukrainian SSR has developed a thickness gauge for measuring the layer of silver on a speculum or under a protective layer of paint or lacquer. (Moscow, Promyshlennno-Ekonomicheskaya Gazeta, 11 Jul 58)

The Groznyy Electrical Machinery Plant (Groznskiy elektromekhanicheskiy zavod) has produced experimental models of stationary and portable electronic instruments (4) for controlling the quality of petroleum products flowing through a pipeline.

The instruments check the sequence of pumping the petroleum products in the pipeline and detect impurities when they are pumped into tanks. (Moscow, Neftyanik, Oct 58, facing page 18)

(4) Photo showing V. Roshchin, chief power engineer of the plant (right), and N. Shigorin, a machinist, checking a stationary model of the instrument available in source, facing page 18, top

The Kiev Pribor Plant has produced the RS-25 rotary gasometer for measuring the total amount of inert gases in the pipelines of small industrial installations. (Moscow, Izmeritel'naya Tekhnika, No 5, 1957, p 48)

The Chair of Electrical Machinery of the Tomsk Electrical Machinery Institute of Railroad Transport Engineers (TEMIIT) is studying brush sparking of the traction motors of electric and diesel locomotives.

The basic instrument for studying the commutation of traction motors is an II-1 photoelectric brush-spark indicator, which was designed in the Tomsk Branch of the Scientific Research Institute of the Electrical Engineering Industry.

The II-1 is also helpful in solving many problems connected with the quality of commutation of electric motors, and helps to establish precisely the intensity of brush sparking, and to select the proper type of brushes for new motors.

The Tomsk Branch of the Scientific Research Institute of the Electrical Engineering Industry has also developed a special vibration-proof transmitter. This provides oscillograms not only of the spark photocurrent, but also of the current of the locomotive and of the contact voltage. This permits a determination of the degree to which the intensity of the brush-spark changes at all intermediate stages of operation of traction motors. An analysis of the oscillograms indicates that engine vibrations exert a very strong influence on brush sparking.

These instruments for studying sparking may be used not only in railroad transport, but also in other branches of the economy which make use of commutator motors. (Moscow, Promyshlennno-Ekonomicheskaya Gazeta, 9 Jul 58)

The Leningrad Elektropul't Plant has supplied complex apparatuses and instruments for the central control panel in operation at the Kuybyshev Hydroelectric Power Station. The plant has made control panels and telemetering apparatus for the An-shan Metallurgical Combine and an electric power station in the People's Republic of China. It is now engaged in the production of an entire group of dispatching and telemechanical equipment for the metallurgical plant in Bkhilai, India. The plant has also sent equipment to Poland, Rumania, Bulgaria, Vietnam, the Democratic People's Republic of Korea, the United Arab Republic, and other countries.

V. N. Chepurin, chief of the plant's design bureau, said that the plant, in conjunction with the Central Scientific Research Laboratory of the Ministry of Electric Power Stations and the Institute of Automatics and Telemechanics of the Academy of Sciences USSR, is developing contactless telecontrol units which are superior to the contact relay units now produced by the plant. (Leningradskaya Pravda, 16 Jul 58)

3. Geophysical

The L'vov Institute of Machine Studies and Automatics of the Academy of Sciences Ukrainian SSR is developing highly sensitive geophysical apparatus. Some of its instruments have already been tested and are being put into production.

The ESK-1 electronic autocompensator with direct reading is designed for the rapid precision measurements of small electric voltages and currents during shallow and medium-depth prospecting. The KSR-5 instrument, which has a computer unit, automatically solves equations which determine the electrical resistance of minerals of a region. Both instruments have been successfully tested and have been submitted for series production at the Leningrad Geologorazvedka Plant.

The EAK-3 automatic instrument is designed for electrical research under unfavorable interference conditions. This instrument registers its measurements on motion-picture film, and is in actuality a portable electrical prospecting laboratory.

The ESh0-56 loop oscillograph, which is portable and light and can be carried by one person, is used for electrical prospecting for oil and gas deposits.

The highly sensitive EDA-56 two-channel instrument, which has a high input resistance, is used for prospecting by using telluric currents. This instrument will be produced by the Mytishchi Instrument Making Plant, which will include it in its truck-mounted electrical prospecting laboratory.

The most interesting instruments under development by the institute are those based on transistors. One of them, the ETA-1, is much lighter and more reliable and economical than the vacuum-tube ESK-1 instrument, which is used for the same purpose. The institute is continuing its efforts toward transistorizing the circuits of all of its apparatus. -- Prof K. Karandeyev, Scientific Leader of Work, Corresponding Member of the Academy of Sciences USSR; L. Mizyuk, Chief of a Division of the Institute of Machine Studies and Automatics of the Academy of Sciences Ukrainian SSR, Senior Scientific Fellow (Moscow, Promyshlennno-Ekonomicheskaya Gazeta, 27 Jun 58)

4. Aircraft

The magnetoelectric oscillographs best suited for studying and testing aircraft equipment are those developed by one of the instrument making plants of the State Committee for Aircraft Technology and by a scientific research institute. Those oscillographs are the K5-22 miniature five-component type, the K9-21 nine-component type, the K12-21 twelve-component type, the 12-OS-2 twelve-component type, and the K20-21 twenty-component type.

The K12-21, 12-OS-2, and K20-21 oscillographs are also suited for use in other branches of science and technology.

USSR magnetoelectric oscillographs are almost as good basically as the best models made by foreign firms, such as Consolidated, Midwestern, Honeywell-Highland, and Hathaway.

(Source gives more detailed information on these oscillographs.)
(Moscow, Priborostroyeniye, Dec 58, pp 17-18)

B. Photographic Supplies

The Kama is an amateur's small motion-picture camera with a spring drive and magazine loading. It uses 8-mm reversible perforated film (1 x 8), the size of each frame being 3.6 x 4.8 mm. It has two speeds (16 and 32 frames per second) and single frame exposure. The lens is f:2.8/12.5 mm, and a supplementary lens permits photographing of writing, besides which there are two filters (orange and smoked). Three magazines with 10 meters of film in each, provided with the Kama, permit fast and efficient loading in daylight.

The Kama is equipped with a frame counter and an indicator in the viewer which indicates proper winding of the film. The camera can be hand-held or placed on a tripod. The Kama is carried in a case measuring 130 x 125 x 56 mm, the cover of which contains pockets for the supplementary lens and filters. Spare magazines are carried in a special case which fits easily in the pocket.

The camera (without carrying case) weighs 670 grams. It is priced at 1,200 rubles. (Moscow, Novyye Tovary, No 11, 1958, p 2)

The 8P-1 motion-picture projector is used for projecting film of 1 x 8 or 2 x 8 mm and is powered from a 110-, 127-, or 220-volt source. The voltage selector is on the bottom of the projector.

A K-30 bulb (170 watts, 17 volts), which is used as a light source, provides even illumination for a 1- x 0.75-meter screen. The lens is f:1.6/17.6 mm, and is focused by moving the lens barrel. The projector set includes large (100 meters) and small (50 meters) spools, and a film speed of 16 frames per second is maintained by a rheostat. Rewinding of the film is done manually.

The size of the 8P-1 with the large spools is 267 x 160 x 400 mm; size of the carrying case is 305 x 22 x 295 mm; and weight (without carrying case) is 5.5 kg. The cost of the 8P-1 is 1,320 rubles. (Moscow, Novyye Tovary, No 11, 1958, p 2)

I. Krutyakov has prints made from his negatives at Photographic Laboratory No 13, Ul'yankovskaya Ulitsa, 27, Moscow. However, this laboratory makes prints on ordinary glazed photographic paper only. On offering to supply his own paper of another type, Krutyakov was told that the cost would be the same as if the laboratory used its own paper.

Velitsyn decided to have his Zorkiy camera equipped with flash synchronization so that he could use it with a Molniya flash attachment. After visiting a number of workshops which neither have available nor install synchronization equipment, Velitsyn has concluded that it is impossible to find a simple part costing 30-40 rubles in order to improve a camera which costs up to 1,000 rubles. (Moscow, Vechernyaya Moskva, 28 Aug 58)

C. Miscellaneous

The L'vov Gas Apparatus Plant [apparently a new plant] has begun the production of new water heaters which have been designed by the plant's design and technological section, in conjunction with the Institute of Gas Consumption of the Academy of Sciences Ukrainian SSR. (Moscow, Promyshlennno-Ekonomicheskaya Gazeta, 11 Jul 58)

The Moscow Mosrentgen Plant is currently developing the RUM-10, an improved diagnostic X-ray machine. (Moscow, Leninskoye Znaniye, 23 Jul 58)

Recently, the Moscow EMA Electromedical Apparatus Plant produced test models of a portable electric sleep-inducing apparatus. These models have undergone successful testing in a number of clinics and will soon be put into series production. (Moscow, Nauka i Zhizn', Nov 58, p 22)

VI. ELECTRICAL PRODUCTS

A. Rotating Machinery

After reconstruction, the Poltava Elektromotor Electrical Machinery Plant has been put into operation, and its first electric motors have been series-produced. This plant will produce thousands of small electric motors during July. (Kiev, Pravda Ukrainy, 4 Jul 58)

The Poltava Glavprod mash Plant has been reconstructed and converted into an electrical engineering plant which is currently called the Poltava Elektromotor Plant. This plant has started the production of small electric motors and electric floor polishers. (Kiev, Pravda Ukrainy, 15 Jul 58)

A new type of controlled single-armature converter, the "avtodin," was developed in 1941. In 1948-1952 experimental models of the series A2B-A6B "avtodin" and prototypes of the experimental AZ series of battery-charging "avtodin" were built.

A plant of the Scientific Research Institute of the Electrical Industry has built a 3.5-kw A2-A6B "avtodin," which will be supplied from industrial AC circuits.

The Yaroslavl' Electrical Machinery Plant has produced an experimental series of open-type "avtodin" for charging storage batteries. At present, a number of series AZ "avtodin" are being used successfully in the battery charging stations of the Ministry of Railways and other organizations.

(Source gives full details on these converters.) (Moscow, Vestnik Elektromyashlennosti, Sep 58, pp 36-41)

B. Welding Machines

The Leningrad Elektrik Plant has manufactured a new welding machine designed for welding ring-shaped parts out of stainless steel. The entire welding cycle of this machine is fully automated. (Leningradskaya Pravda, 4 Jul 58)

The Leningrad Elektrik Plant has manufactured the first industrial group of Udar-300 electric welding installations. These welders are designed for manual electric arc welding in an argon medium with a 300-ampere current. The inert gas protects the melting metal from oxidation, as a result of which the welding seam retains high mechanical qualities.

The production of these new welding machines was mastered by the plant in very close cooperation with the All-Union Scientific Research Institute of Electric Welding Equipment.

Semiautomatic and automatic machines for argon arc welding are currently under development. (Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 9 Jul 58)

Scientific workers of the Laboratory of Electrothermy of the Institute of Electrical Engineering of the Academy of Sciences Ukrainian SSR have developed a special welding machine for the capacitance-welding of ferrous or nonferrous metal parts ranging in thickness from 0.02 to 0.5 mm.

The TKM-4 capacitance spot welding machine has already been put into series production at the Kiev Electrical Measuring Instrument Plant.

The laboratory also recently developed an ShKM-3 installation which will weld a high-quality seam 13-50 running meters long in one hour. (Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 6 Jul 58)

The Tbilisi Electric Welding Equipment Plant was founded on the base of a machinery and repair plant of the Ministry of Water Resources Management Georgian SSR. This plant, which has been in existence since 1953, occupies an area of 4,300 square meters, has several shops, and employs 140 workers and 25 engineers and technicians. This small plant will become a huge enterprise producing some 70 million rubles' worth of products by the end of the coming 7-year plan. It is expected to produce 5 million rubles' worth in 1959.

This plant is being aided in its conversion by the Leningrad Elektrik Plant and by Giproenergoprom [State All-Union Planning Institute for the Power-Engineering Industry]. A capital investment of approximately 31 million rubles is planned during the 7-year plan.

All work of this plant will be developed in close cooperation with the activities of the Institute of Electric Welding imeni Paton and the All-Union Scientific Research Institute of Electric Welding Equipment.

A group of up to 30 workers and specialists will soon go to Moscow and Leningrad to acquaint themselves with the methods used in the manufacture of electric welding equipment. -- O. Mosiashvili, Director, Tbilisi Electric Welding Equipment Plant (Tbilisi, Zarya Vostoka, 2 Jul 58)

C. Other Products

The Leningrad Sevkabel' Plant has produced cable rated for 500,000 volts. At present this cable is undergoing thorough testing in the plant's high-voltage laboratory. (Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 22 Jun 58)

L'vov Glass Plant No 2 has put into operation a constant-flow line for the production of alkaline-glass high-voltage insulators. The line consists of a charge mixer (shikhtoprigotovitel'), a glass furnace, two presses, conveyers for equalizing temperatures, and a heat hardening installation. The manufacturing method for these insulators was developed by the Chair of Electric Power Stations and Electric Power Networks of the L'vov Polytechnic Institute.

By the end of the year, 15,000 of these insulators will be produced. (Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 16 Jul 58)

The Nizhnedneprovskiy Svetofor Electrical Engineering Plant [Nizhnedneprovskiy elektrotekhnicheskii zavod "Svetofor"] of the Ministry of Railways is engaged in the production of illumination equipment for railways, including the type PS-45 directional signal lights.

(Source gives ample details on the plant, its history, and operations.) (Moscow, Avtomatika Telemekhanika i Svyaz', Nov 58, pp 37-38)

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